SUMMARY OF TEMPERATURE AND PRECIPITATION BY SECTIONS, AUGUST, 1904.

In the following table are given, for the various sections of the Climate and Crop Service of the Weather Bureau, the average temperature and rainfall, the stations reporting the highest and lowest temperatures with dates of occurrence, the stations reporting greatest and least monthly precipitation, and other data, as indicated by the several headings.

The mean temperatures for each section, the highest and lowest temperatures, the average precipitation, and the greatest and least monthly amounts are found by using all trustworthy records available.

The mean departures from normal temperature and precipitation are based only on records from stations that have ten or more years of observation. Of course the number of such records is smaller than the total number of stations.

Section.	Temperature—in degrees Fahrenheit.							Precipitation—in inches and hundredths.					
	Section average.	Departure from the normal.	Monthly extremes.					Section average.	Departure from the normal.	Greatest monthly.		Least monthly.	
			Station.	Highest.	Date.	Station.	Lowest.	Date.			Station.	Amount.	Station.	Amount.
Alabama	78.4	— 1.2	Newbern	101	24	Maple Grove, Riverton, Valleyhead, Anniston	55	27, 28, 29	5.55	+1.11	Goodwater	13.17	Florence	1.38
Arizona	79.7	— 0.3	Fort Mohave	118	5	Flagstaff	46	30	3.60	+1.34	Huachuca Reservoir	9.00	Fort Mohave	0.38
Arkansas	78.1	— 1.1	Newport	105	25	Fort Defiance	46	21, 22	2.77	—0.59	Helena, No. 2	6.40	Osceola	0.33
California	73.9	+ 0.2	Mammoth Tank, Volcano Springs	114	6, 10	Oregon	46	27	2.77	—0.59	Helena, No. 2	6.40	Osceola	0.33
Colorado	63.7	— 1.5	Blaine	103	29	Bodie	24	30	0.17	+0.10	Laguna Valley	6.95	42 stations	0.00
Florida	80.1	— 1.1	Clermont	101	19	Halls Gulch	21	22	2.43	+0.44	Longs Peak (near)	6.50	Las Animas	0.00
Georgia	77.6	— 1.4	Westpoint	101	23	Monticello	61	5, 6	7.40	—0.13	Sumner	17.46	Malabar	2.53
Idaho	67.8		Garnet	110	15	Diamond	54	28	7.33	+1.44	Albany	14.33	St. Marys	2.34
Illinois	70.7	— 3.0	Equality	98	14, 25	Chesterfield	21	22	0.42		Chesterfield	1.78	Garnet	T.
Indiana	71.1	— 2.1	Rome	101	14	Lanark	37	8	4.12	+1.04	Aledo	7.58	Olney	1.76
Iowa	69.1	— 2.7	Mount Ayr, Waukee	97	13	Auburn, Syracuse, Topeka, Ft. Wayne, Bluffton, Northfield	42	8, 8, 8, 27	2.45	—0.82	Syracuse	6.79	Cambridge City	0.87
Kansas	74.6	— 2.6	Jetmore, Ness City	104	28, 13	Earlham	35	8	3.43	0.00	Fort Dodge	6.75	Sibley	0.66
Kentucky	75.2	— 0.9	Cadiz	100	14	Hanover	38	26	3.35	+0.07	Sedan	9.27	Chapman	1.06
Louisiana	80.2	— 1.2	Libertyhill	102	24	Beaverdam	45	27	2.64	—0.13	Mount Sterling	5.52	Scott	0.59
Maryland and Delaware	71.9	— 1.9	Boettcherville, Md., Hancock, Md	97	1	Plain Dealing	53	28	5.19	—0.29	Port Eads	13.31	Caspiana	1.66
Michigan	63.5	— 2.5	Arbela	91	14	Deer Park, Md., Oakland, Md	31	27, 31	2.91	—0.70	Darlington, Md	8.74	Jewell, Md	0.69
Minnesota	64.9	— 2.5	Beardsley	98	12	Wetmore, Omer	25	10, 30	2.81	+0.34	Petosky	7.95	Lapeer	1.05
Mississippi	79.4	— 0.8	Laurel	102	24	Pokegama Falls	27	29	2.77	—0.26	St. Cloud	6.00	Moorhead	0.96
Missouri	73.7	— 2.2	Warrensburg	100	15	Austin, Hernando	56	27	4.07	—0.37	Pecan, (Swartwout)	14.18	Indianola	0.65
Montana	65.1	— 0.2	Springbrook	111	10	Monroe City	43	23	5.46	+2.31	Maryville	9.51	Doniphan	1.98
Nebraska	70.9	— 1.7	Kirkwood	104	14	Grayling	17	22	0.64	—0.21	Columbia Falls	1.82	Lamedeer	T.
Nevada	68.6	— 1.2	Sodaville	105	7	Brokenbow, Hay Springs, Kennedy	36	22, 22	2.80	—0.02	Grand Island	6.83	Gering	0.54
New England*	65.3	— 2.5	Nashua, N. H	93	1	Tecoma	22	20, 21	1.81	+1.33	Palmetto	6.95	2 stations	0.00
New Jersey	70.8	— 1.7	Indian Mills, Bridgeton, Vineland	92	1, 7	Vanceboro, Me	30	30	4.30	+0.25	Norwalk, Conn	8.45	Cornwall, Vt	1.95
New Mexico	70.6	— 0.9	Alamogordo, San Marcial	103	1	Layton	37	27	6.62	+2.14	College Farm	13.01	Cape May	2.65
New York	65.6	— 1.5	Berlin, Chatham	94	1	Charlotteburg	37	24	2.24	+0.04	Fort Wingate	5.65	Fruitland	0.06
North Carolina	75.1	— 1.0	Selma	100	21	Winsors	39	12	3.96	—0.11	Oyster Bay	10.60	Otto	1.63
North Dakota	63.3	— 2.0	Dickinson	102	2	Indian Lake	28	30	6.24	+0.41	Monroe	11.89	Lewisburg	3.00
Ohio	68.8	— 2.8	Camp Dennison	97	25	Linville	40	28	1.67	—0.21	Cando	5.37	Melville	0.20
Oklahoma and Indian Territories	79.0	— 2.2	Hobart, Okla	107	29	McKinney	31	2	2.74	—0.11	Oberlin	5.57	Cincinnati	0.41
Oregon	67.3	+ 1.5	Blalock	110	5	Green Hill, Orangeville	38	27	3.01	+0.96	Whiteagle, Okla	7.58	Goodwater, Ind. T	0.50
Pennsylvania	68.0	— 1.8	Lock Haven	96	1	Fairland, Vinita, Ind. T., Grand, Okla	52	27, 26	0.21	—0.39	Warmspring	1.95	13 stations	0.00
Porto Rico	79.1		Cayey	98	23	Beula, Wallowa, Pine, Riverside	29	21, 22, 20	4.36	+0.33	Easton	9.64	Everett	1.66
South Carolina	77.6	— 1.7	Sumter	102	22	Grampian, Pocono Lake	34	27	8.01		Cidra	20.01	Coamo	0.94
South Dakota	68.8	— 1.6	Herried	105	3	Adjuntas	54	30	8.47	+2.17	Effingham	13.43	Aiken	3.92
Tennessee	76.0	0.0	Dover, Lewisburg, Pope	101	25, 31	Cheraw, Greenville	54	28	2.19	—0.20	Tyndall	5.37	Oelrichs	T.
Texas	81.0	— 1.2	Brownwood	109	29	Ramsey	30	22	3.00	—0.87	Grace	7.50	Lebanon	1.04
Utah	69.4	— 0.9	St. George, Rockville, Hite	104	5, 6, 14	Dickson	47	27	2.25	0.00	Hearne	6.36	2 stations	0.00
Virginia	72.8	— 1.6	Stephens City	96	22	Texarkana, Bonham, Graham	52	29, 30	1.06	0.00	Monticello	3.91	2 stations	0.00
Washington	66.2	— 0.2	Kennewick	112	5	Soldier Summit	22	22	3.37	—0.86	Callaville	9.27	Stephens City	0.53
West Virginia	70.7	— 1.3	Martinsburg, Moorefield	95, 95	1, 25	Burkes Garden, McDowell, Cle-Elum, Cusick, Northport	38, 30, 30	28, 24, 21	0.30	—0.36	Coupeville	1.13	6 stations	0.00
Wisconsin	64.6	— 3.2	Prairie du Chien	95	12	Bayard	32	27	2.88	—1.09	Beverly	6.71	Cuba	0.67
Wyoming	63.0	— 0.6	Fort Laramie	100	14	Agr. Exp. Station (near Grand Rapids), Daniel	26, 17	8, 22	2.90	—0.04	Butternut	6.56	Menasha	0.59
									1.16	—0.06	Phillips	3.11	Lusk	0.05

*Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut.

SPECIAL ARTICLES.

LOCAL STORM AT ST. LOUIS, MO., AUGUST 19, 1904.

By L. H. DAINGERFIELD, Observer Weather Bureau.

General conditions.—A well-defined storm area was central over northeastern Kansas and southeastern Nebraska on the morning of August 19, the lowest pressure being 29.70 inches at Concordia, Kans., and Omaha, Nebr. An almost ideal cyclonic circulation was evident around the center of the low area, and rain was falling from Iowa and Missouri eastward to Ohio. St. Louis, in the southeastern quadrant of the depression, was favorably located for the visit of severe local storms. By 8 p. m. the storm center had moved eastward to southeastern Iowa, where the pressure had fallen to 29.60 inches, and by 8 a. m., August 20, the center of the disturbance was over the lower Lakes, the lowest pressure being 29.58 inches at Buffalo, N. Y., showing a constant increase in movement and intensity.

Local conditions.—The pressure at St. Louis, at 8 a. m. August 19, was 29.89 inches; there was a constant decline thereafter until about 9 p. m., when the lowest point was reached, 29.66 inches reduced pressure or 29.06 station pressure; the relative humidity was high during the greater portion of the day, 94 per cent at 8 a. m., 91 per cent at 1 p. m., dropping slowly to 79 per cent by 8 p. m. A thunderstorm appeared in the northwest portion of the city during the early afternoon, the first thunder being heard at 2:55 p. m. This storm moved in an easterly direction to the north of the station; it was very local in character, and was confined to the northern portion of St. Louis and Madison. The storm gradually became more threatening over north St. Louis, the cloud movement indicating a rather violent local disturbance in that locality, but at no time did the storm appear especially destructive at any great distance from its path of action. As its course was 2 miles north of the local Weather Bureau office, it was beyond the vision of the observer. At 3:55 p. m. the storm assumed the characteristics of a tornado, violent winds being first noticeable at about No. 3200 north of Market street and No. 2500 west of the river; it moved almost due east, the extreme width of the path being about seven blocks, from No. 3200 to No. 3900 north. It appears to have bounded at intervals, from the fact that its destruction was less marked at some points along its path than at others. The storm evidently reached its maximum strength from Broadway, No. 500 west, to Second street, where telephone and electric light poles were broken and thrown to the ground, and the Broadway street car service was suspended until the next day; the Granite Iron Rolling Mills, No. 3400 north, seemed to have suffered the most severely, the estimated damage being $25,000; about four other business houses were damaged and twenty-five or thirty dwellings injured. The writer personally inspected the damaged district and noted that the damage usually consisted of unroofed buildings, broken poles, electric and telephone wires; at no point did the damage appear to be irreparable or absolute.

The storm, after leaving St. Louis at the river front, passed eastward to Madison and East Madison, where it continued its devastation. The total property loss in St. Louis, according to conservative estimates, does not exceed $100,000, and perhaps about the same amount in Madison and East Madison.

Three fatalities were reported and twenty persons were injured.

A peculiarity of the storm was its extremely local character. While the storm was at its height at 3:55 p. m. in north St. Louis, the central and southern portions of the city experienced only moderate breezes, partly cloudy sky, and but slight changes in temperature. Very little rain occurred, except in the immediate path of the storm. The temperature at 3 p. m. at this station was 83°; 4 p. m., when the storm was at its height, 82°; 5 p. m., 84°; the maximum wind, which occurred at about 4 p. m., was only 24 miles per hour; the barograph trace shows a steady fall in pressure, reaching 29.13 inches when the storm was passing north of the station, with a very slight rise of only 0.03 of an inch shortly after 4 p. m., and falling thereafter to a minimum pressure of 29.06 inches at about 9 p. m. The instruments at the exposition showed even less variation than did the station instruments.

CLOUDBURST NEAR CITRUS, CAL.

By W. E. BONNETT, Assistant Observer, in charge, Independence, Cal.

On August 8 showers were forming over the mountain peaks at 9:30 a. m. (Pacific time), somewhat earlier in the day than seems usual here. They gradually increased in number and extent until about 11:30 a. m., when the entire sky was overcast and threatening. The first thunder was heard at this time. These conditions culminated in very severe thunderstorms in the ranges, both to the east and west of us.

The most excessive precipitation occurred over what is known locally as Mazuka Canyon, cut in the western slope of the Inyo Range. This opens to a gently sloping sage-brush plain, three miles from the station of Citrus. When the flood emerged from the Canyon it spread itself over the fan-shaped deposit there, and flowed with a front of nearly two miles and a depth of several feet toward the station at Citrus. The country over which the water came is wholly uninhabited and the only damage that was done occurred about the station. Here several hundred feet of the railroad track were washed away and for a greater distance it was covered over with débris. One and one-fourth miles of an irrigating ditch, belonging to the East Side Canal Company, was filled up.

THE ANNUAL AND GEOGRAPHICAL DISTRIBUTION OF CYCLONES OF HIGH VELOCITY (OVER 500 MILES IN TWELVE HOURS) IN THE UNITED STATES, 1893-1902.[1]

By STANISLAV HANZLIK, Ph. D. (Prague).

Summary.—The object of the study, the preliminary results of which are herein summarized, was to determine the influence of areas of high pressure (highs), and especially of the so-called St. Lawrence high,[2] upon the velocity and direction of movements of areas of low pressure (lows). In preparation for this investigation, all cyclones of high velocity (over 500 miles in twelve hours) during the years 1893–1902 were considered. No relation between the velocities of cyclones and the barometric gradient could be made out in the case of cyclones in the western portion of the southern circuit.[3]

The reason for this fact was doubtless that of about 130 cyclones in ten years there were about 110 secondary lows, which were deflected to the south, and the laws of the movements of secondary lows, which are under the influence of primary lows, are extremely complex. The 20 primary cyclones remaining showed too little similarity for purposes of comparison. But it distinctly appeared that the relation of the velocity of cyclones to the gradient was such that higher velocities occurred with weaker gradients in front of the cyclones.[4]

The next point taken up was the geographical distribution of the occurrence and of the velocities of rapidly moving cyclones, and, as is shown in the tables and charts which follow, there is a distinct deflecting and splitting effect on the part of the St. Lawrence high in the case of the eastern portion of the southern circuit track of these cyclones. The lows which are deflected to the right of the high move more rapidly than those which are deflected to the left. The splitting in the northeast is most marked in February and March, and there is practically none in January. This is probably due to the nearly equal velocities of lows and highs in January and to the passage of the southern circuit lows to the left of the St. Lawrence high in November and to the right in December.

No definite answer has been obtained to the question set as the object of this study, but some preliminary results have at

[1] Preliminary report on work done during the year 1903–4 in the course Geology 26 (Climatology: advanced course), given under the direction of Prof. R. De C. Ward, in Harvard University.

The instructor's share in this work has been limited to some general suggestions at the beginning of the investigation, occasional conferences during its progress, and a revision of this report for publication.—ROBERT DE C. WARD.

[2] The term "St. Lawrence high" is attributed to any high which, on its path eastward, hangs persistently in the locality of the Gulf of St. Lawrence, checking the progress of lows from the west.

[3] "Northern circuit" is one main path of circulation of cyclones passing directly eastward (from the Northwest British Possessions) over the Great Lakes and the St. Lawrence Valley to Newfoundland.

"Southern circuit" is second main path of circulation of cyclones along the Rocky Mountain slope southeastward to Texas, thence eastward over the Gulf States to the Carolinas, and thence northeastward to the Banks of Newfoundland.

[4] See E. B. Garriott: Types of storms in January. Monthly Weather Review, January, 1895, p. 10.